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other two times a square. Being known *one* of the values of n in $\frac{n(n+1)}{2} = \square$, the value next succeeding as well as the value just preceding can be found by the following formula which I deduced by inspection :

$$\frac{n(n+1)}{2} = \left(2n_1 + 1 \pm 3 \sqrt{\frac{n_1(n_1+1)}{2}}\right)^2$$

in which n_1 is a known value of n . By inspection we find that when $n=1$, $\frac{n(n+1)}{2} = \square = 1^2$. Now put $n_1=1$, and substituting in the formula, we obtain $\frac{n(n+1)}{2} = 6^2$ or 0^2 , 6^2 being the \square next succeeding and 0^2 the square just preceding 1^2 . From $\frac{n(n+1)}{2} = 6^2$, we obtain $n=8 (=2 \times 2^2)$, or $-9 (= -3^2)$, and $n+1=9 (=3^2)$ or $-8 (= -2 \times 2^2)$. Now put $n_1=8$, and substituting in the formula, we get $\frac{n(n+1)}{2} = (35)^2$ or $(-1)^2$, the positive value being the next succeeding square and the negative value the one just preceding, the latter being the square with which we started. From $\frac{n(n+1)}{2} = 35^2$, we find $n=49$ or -50 , and $n+1=50$ or -49 . By continuing this process, we find the first six positive integral values of n in $\frac{n(n+1)}{2} = \square$, to be 1, 8, 49, 288, 1681, and 9800.

IV. Solution by BENJ. F. YANNEY, A. M., Professor of Mathematics, Mount Union College, Alliance, O.

Let $n=p^2$ or p^2-1 , since it must be a perfect power, or a perfect power less 1. Then $\frac{n(n+1)}{2} = \frac{p^2(p^2 \pm 1)}{2} = a^2$; whence, $p^2 \pm 1 = \frac{2a^2}{p^2} = 2q^2 \dots\dots(1)$.

Adding $2q^2 + 4pq + p^2$ to each member of equation (1), we have,
 $2q^2 + 4pq + 2p^2 \pm 1 = 4q^2 + 4pq + p^2$; or $(2q+p)^2 \pm 1 = 2(q+p)^2 \dots\dots\dots(2)$.

Since equations (1) and (2) are the same in form, if we find one set of integral values for p and q in (1), we can then readily find succeeding values by (2). Now, for $p=1$, $q=1$. \therefore Other values are: 3 and 2; 7 and 5; 17 and 12; 41 and 29; 99 and 70; and so on. Then by formula $\frac{n(n+1)}{2} = \frac{p^2(p^2 \pm 1)}{2}$, the first positive integral values of n are found to be 1, 8, 49, 288, 1691, 9800.

Also solved by J. H. DRUMMOND, C. D. SCHMITT, H. C. WILKES, G. B. M. ZERR, and the PROPOSER.

ERRATA. On page 368 of December issue, line 4, for “(10+2)” read (10^m+2) ; line 9, at end, for “ B^2 ” read B_1^2 ; line 12, for “ B^2 ” read B_1^2 , and for

" $(B+1+A_1)$ " read $(B+1-A_1)$; line 19, for "hypotenuse" read hypotenuse; line 22, leave out comma after 6; line 26, for " p, b, d ," read p, d, b ; line 30, for "13, 14, 15," read 13, 15, 14; page 369, line 8, for "from" read for; line 25, for "the" read their; line 35, for " $a^{mn}+1$ " read a^m+1 ; page 370, line 2, insert a comma before the sign of equality; and credit J. H. Drummond with a solution of No. 32.

NOTES, CRITICISMS, ETC., BY ARTEMUS MARTIN, LL. D.

On page 285 Mr. Adcock gives "An Equation for the sum of Squares equal a Square" which he says he has not seen published. I used the same method in the *Mathematical Magazine*, Vol. II., page 71, to find *three* square numbers whose sum is a square; and in a paper I had read at the last meeting of the American Association for the Advancement of Science I found in the same way *four* squares whose sum is a square. It is easily seen that the formula may be extended so as to find any number of squares whose sum is a square.

Note on Solutions of Problem 27, pp. 329-331.—In the *Mathematical Magazine*, Vol. II., No. 9, page 157, I have given a general method of finding any number (greater than two) of positive cube numbers whose sum is a cube, and on page 158 applied it to the case of five cubes, obtaining the set

$$6^3 + 11^3 + 13^3 + 18^3 + 20^3 = 26^3.$$

In Problem 42, p. 332, " $2a^2 + 2b^2 - c^2 + d^2$ " should be $2a^2 + 2b^2 = c^2 + d^2$.

PROBLEMS.

45. Proposed by J. K. ELLWOOD, A. M., Principal of Colfax School, Pittsburg, Penn.

Solve the equation $x^3 + y^2 = a^2$.

46. Proposed by JOSIAH H. DRUMMOND, LL. D., Portland, Maine.

Give a general solution, finding such values of a and b in $x^2 + x\sqrt{xy} = a$ and $y^2 + y\sqrt{xy} = b$ as will make x and y integral.